

Notice of Allowability

Application No.

10/608,808

Examiner

Beth E. Owens

Applicant(s)

JIN ET AL

Art Unit

2824

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-18.
3. ☒ The drawings filed on 30 June 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 06302003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


RICHARD ELMS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Examiner's Amendment

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to Applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

In the Specification:

Page 1, line 18: replace "polyside" with --polycide--.

Page 1, line 31: replace "It is because the" with --The--.

Page 2, line 10: insert --a-- before "word".

Page 2, line 12: insert --the-- before "word".

Page 2, line 13: insert --a-- before "gate".

Page 2, line 14: insert --the-- before "word".

Page 3, line 8: insert --with-- before "the Si".

Page 3, line 9: delete "a" before "TiSi₂".

Page 3, line 19: replace "complicates" with --complicate--.

Page 3, line 24: replace the entire line with --of the semiconductor device, and to form openings for the bit lines having stable resistances, by--.

Page 4, line 1: insert a comma after "structure".

Page 4, line 2: insert a comma after "opening".

Page 4, line 23: insert --a-- before "PET".

Page 4, line 26: insert --an-- before "ion".

Page 4, line 28: insert --a-- before “method”.

Page 5, line 6: insert --a-- before “word”.

Page 5, line 8: insert --the-- before “word”.

Page 5, line 9: insert --a-- before “gate”.

Page 5, line 10: insert --the-- before “word”.

Page 5, line 12: insert --the-- before “word”.

Page 5, line 33: replace “oxidize” with --oxidizes--.

Page 6, line 1: replace “for” with --before--.

Page 6, line 5: replace “PET subsequence” with --PET, a subsequent--.

Page 6, line 11: replace “condition” with --conditions--.

In the Claims:

Claim 1, line 8: insert a comma after “structure”.

Claim 1, line 9: insert a comma after “opening”.

In the Abstract:

Replace the abstract with the following:

A method for forming a bit line of a semiconductor device wherein a first opening in an interlayer insulation film is formed in a P+ S/D (source/drain) region, a post etch treatment (PET) for stabilizing the resistance in the P+ S/D opening is performed, followed by the subsequent formation of a second opening in the N+ S/D region, such that any increase of the resistance of the N+ S/D opening by the PET is thereby prevented.

Allowance

2. Claims 1-18 are allowed.

3. The following is an examiner's statement of reasons for allowance:

There is no prior art available nor obvious motivation to combine elements of prior art which teach a method for forming a bit line of a semiconductor device, comprising the steps: (a) forming a P+ S/D region and an N+ S/D region on a semiconductor substrate; (b) forming a planarized interlayer insulating film on the entire surface of the resulting structure; (c) etching the interlayer insulating film to form a first opening exposing the P+ S/D region; (d) subjecting the entire surface of the resulting structure, including the first opening, to a P+ ion implantation process; (e) etching the interlayer insulating film to form a second opening exposing the N+ S/D region; (f) forming a barrier metal layer on the entire surface of the resulting structure including the first and second openings; (g) forming a tungsten layer filling the first and second openings on the entire surface of the resulting structure; and (h) selectively etching the tungsten layer and the barrier metal layer to form a bit line.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should

Art Unit: 2824

preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth E. Owens, Ph.D. whose telephone number is 571.272.1882 and fax number for unofficial communications is 571.273.1882.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Elms, can be reached on 571.272.1869. The fax phone number for the organization where this application or proceeding is assigned is 703.872.9306 for official communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571.272.2800.

BEO 06.27.04

BEO